

Patent Claims

1. Method of drying photo resist layers, wherein a substrate (12) with a photo resist layer applied thereon is exposed to IR radiation from an IR radiation source (4) whose power is controllable, in a deaerated chamber, wherein the temperature or a temperature-dependent parameter is measured in the vicinity of said photo resist layer, and the power of said IR radiation source is controlled on the basis of the measured temperature or said temperature-dependent parameter, respectively, in such a way that a predetermined development of the temperature versus time will be observed during the drying operation, characterised in that said predetermined development of the temperature versus time is so selected that the temperature is initially constant and then undergoes a linear, step-shaped or any other increase throughout the drying operation.
2. Method according to Claim 1, characterised in that the temperature is measured underneath said substrate.
3. Method according to any of the Claims 1 to 2, characterised in that the temperature of the area covered by said photo resist is measured from the upper side by means of a pyrometer, with the different emissivity of said substrate, on which the photo resist layer to be dried is applied, being taken into consideration.
4. Method according to any of the Claims 1 to 3, characterised in that the predetermined development of temperature versus time is initially experimentally established for each new combination of materials for said photo resist layer and said substrate.

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5. Method according to any of the Claims 1 to 4,
characterised in that the quantity or the concentration of solvents is detected in circulated air, preferably in an air circulation line issuing from said chamber, and that when the measured value drops below a predetermined limit the completion of the drying process is initiated by down-control of the power of said IR radiation source.
 6. Method according to any of the Claims 1 to 5,
characterised in that an IR radiation source is employed which has its maximum in IR radiation within the range from 1 to 3 µm.
 7. Method according to the Claims 1 to 6,
characterised in that when the photo resist layers of several substrates, which perform a rotary movement about an axis in the chamber, are dried simultaneously the temperature measurement is controlled in such a timed manner that for each passage of one of the substrates through a measuring field where the temperature is measured a measurement is performed.
 8. Apparatus for drying photo resist layers, consisting of a deaeratable chamber (1) comprising an air inlet (2) as well as an air outlet (3), an IR radiation source (4) disposed in said chamber above a substrate mount (5) and controllable in terms of its power, a thermometric sensor (6, 7) provided in said chamber, as well as a controller unit (8) which controls the power of said IR radiation source as a function of the measured temperature in such a way that during the drying operation a predetermined development of the temperature versus time will be observed in said chamber,
characterised in that said substrate mount (5) comprises several individual substrate mounts (14) which are so configured that the substrate is supported only on a narrow edge.

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9. Apparatus according to Claim 8,
characterised in that said IR radiation source (4) is disposed for vertical adjustment above said substrate mount (5).
10. Apparatus according to any of the Claims 8 or 9,
characterised in that said substrate mount (5) is so designed that it is adapted to receive several substrates (12) in a star-shaped juxtaposed arrangement.
11. Apparatus according to any of the Claims 8 to 10,
characterised in that said substrate mount (5) is rotatably supported and adapted to be rotated at a predetermined rotary speed by means of a motor (11) whose speed of rotation is controllable.
12. Apparatus according to any of the Claims 8 to 12,
characterised in that a controllable fan (13) is provided on said air inlet (2).
13. Apparatus according to any of the Claims 8 to 12,
characterised in that said thermometric sensor (6) is constituted by a temperature-dependent resistor, a pyrometer or a thermo element.
14. Apparatus according to any of the Claims 8 to 13,
characterised in that the maximum power consumption of said IR radiation source (4) ranges between 2.5 and 4 kW.
15. Apparatus according to any of the Claims 8 to 14,
characterised in that a sensor is provided for measuring the quantity or the concentration of solvents, respectively, in circulated air, preferably in the air outlet or in an air circulation line issuing from said air outlet, which sensor produces an output signal adapted for use in the determination of the completion of the drying operation and in the down-control of the power of said IR radiation source.

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